

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Yu-Sin YANG

Serial No. 10/777,922 Examiner: Tri T. Ton

Filed: February 11, 2004 Group Art Unit: 2877

Confirmation No. 5474

For: METHOD AND APPARATUS FOR INSPECTING A SUBSTRATE

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Responsive to the Office Action, Paper No. 030606, dated March 23, 2006, please amend the application as follows.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks/Arguments begin on page 7 of this paper.

IN THE SPECIFICATION

Please replace the paragraph beginning at page 6, line 1 with the following:

Referring to FIGS. 5 to 7B, the substrate inspection apparatus 100 preferably includes a laser source 110 for generating a laser beam 20, a detector 120 for detecting a light 30 scattered from a semiconductor substrate 10, an operation unit 130 for analyzing intensities of the scattered light 30, a controller 140 for controlling the operation of the laser source 110, and an image processing unit 150 for receiving an image representing the semiconductor substrate 10 using the intensity of the ~~seattered light 10~~ scattered light 30.

IN THE CLAIMS

1. (Currently Amended) A method for inspecting a substrate for defects, the method comprising:

irradiating ~~first~~ a plurality of light beams onto the substrate, the ~~first~~ a plurality of light beams having different wavelengths;

detecting first intensities of first lights scattered from a surface of the substrate, and detecting second intensities of second lights scattered from impurities on the substrate;

comparing the first intensities of the first lights with the second intensities of the second lights in order to determine differential values between the respective first and second intensities;

irradiating a ~~second~~ selected light beam onto the substrate, the ~~second~~ selected light beam having a wavelength corresponding to a maximum value of the differential values between the respective first and second intensities; and

inspecting the substrate for defects by examining a third light scattered from the surface of the substrate and a fourth light scattered from the impurities on the substrate.

2. (Currently Amended) The method of Claim 1, wherein the ~~first~~ plurality of light beams are irradiated onto a sampling area on the substrate.

3. (Currently Amended) The method of Claim 1, wherein the wavelengths of the ~~first~~ plurality of light beams are in a range of about 250 nm to about 700 nm.

4. (Currently Amended) The method of Claim 1, wherein the inspecting includes:

receiving an image representing the substrate from the third and fourth scattered lights; and

detecting the defects of the substrate based on the image received.

5. (Original) The method of Claim 4, further comprising displaying the image.

6. (Original) A method for inspecting a substrate for defects comprising:

irradiating a first light beam onto a sampling area on the substrate;

varying a first wavelength of the first light beam;

detecting a first intensity variation of a first light scattered from a surface of the sampling area and a second intensity variation of a second light scattered from impurities on the sampling area during variation of the first wavelength;

comparing the first intensity variation with the second intensity variation in order to produce differential light intensity values between first intensities and second intensities corresponding to the first and second intensity variations, respectively;

irradiating a second light beam onto the substrate, the second light beam having a second wavelength corresponding to a maximum value of the differential light intensity values; and

inspecting defects of the substrate using a third light scattered from a surface of the substrate and a fourth light scattered from impurities on the substrate.

7. (Original) The method of Claim 6, wherein the first wavelength is varied by a discrete amount.

8. (Original) The method of Claim 6, wherein the first wavelength is sequentially varied by a predetermined amount.

9. (Original) The method of Claim 6, wherein the first wavelength is varied between about 250 nm to about 400 nm.

10. (Original) The method of Claim 6, wherein the first and second light beams scan the sampling area on the substrate and the entire substrate, respectively.

11. (Original) The method of Claim 6, wherein the inspecting includes:
receiving an image representing the substrate from the third and fourth lights; and
detecting the defects of the substrate based on the image received.

12. (Original) The method of Claim 11, further comprising displaying the image.

13. (Currently Amended) A method for inspecting a substrate comprising:
irradiating a first light beam onto a sampling area on the substrate;
detecting a first light scattered from a surface of the sampling area and a second light scattered from impurities on the sampling area;
producing a differential value of light intensity between a first intensity of the first light and a second intensity of the second light;
repeatedly irradiating the first light beam[[s]] in which a first wavelength of the first light beam is sequentially varied by a predetermined amount;
selecting a second wavelength corresponding to a maximum value of the differential values produced during the irradiating of the first light beam;
irradiating a second light beam onto the substrate, the second light beam having the second wavelength; and
inspecting defects of the substrate using a third light scattered from the surface of the substrate and a fourth light scattered from the impurities on the substrate.

14. (Original) An apparatus for inspecting a substrate for defects, the apparatus comprising:
a light source for irradiating a plurality of light beams onto the substrate, the plurality of light beams having different wavelengths;
a detector for detecting light scattered from the substrate;
an operation unit for comparing first intensities of first lights scattered from a surface of the substrate with second intensities of second lights scattered from impurities on the substrate, for producing differential values of light intensity between the first intensities and the second intensities, respectively, and for selecting a wavelength corresponding to a maximum value of the differential values;
a controller for controlling the operation of the light source such that the plurality of light beams are sequentially irradiated onto the substrate, and a selected light beam having the selected wavelength is irradiated onto the substrate; and
an image processing unit for receiving an image representing the substrate using a light scattered from the substrate by irradiation of the selected light beam, and for inspecting defects of the substrate based on the image received.

15. (Original) The apparatus of Claim 14, wherein the light source includes a tunable optical parametric oscillator laser system.

16. (Original) The apparatus of Claim 14, wherein the wavelengths of the light beams are in a range of about 250 nm to about 700 nm

17. (Original) The apparatus of Claim 14, further comprising a moving stage for supporting the substrate, and moving the substrate so that the light beams scan the substrate.

18. (Original) The apparatus of Claim 14, further comprising a deflector for deflecting the light beams for scanning the substrate.

19. (Original) The apparatus of Claim 14, further comprising a beam expander for expanding the light beams, and a focusing lens for focusing the light beams onto the substrate.

20. (Original) The apparatus of Claim 14, further comprising a display unit for displaying the image.

REMARKS

Claims 1-20 are pending.

Claims 1-20 are allowed.

Claims 1-5 and 13 are objected to.

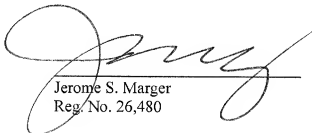
The disclosure is objected to because of the following informalities: in page 6, line 6, reference number 10 has been used to designate both *semiconductor substrate 10* and *scattered light 10*. On page 6, line 6, the phrase “scattered light 10” has been deleted and the phrase – scattered light 30- has been inserted therefor. This amendment overcomes the above informality.

Claim 1-4 and 13 are objected to because of the certain informalities set forth in the Office Action. Claims 1-4 and 13 have been amended to overcome the above informalities. Claims 1-20 are allowable, as stated by the Examiner in the Office Action, since claims 1-4 and 13 have been amended to overcome the objections set forth in the Office Action.

For the foregoing reasons, reconsideration and allowance of claims 1-20 of the application as amended is requested. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, P.C.



Jerome S. Marger
Reg. No. 26,480

MARGER JOHNSON & McCOLLOM, P.C.
210 SW Morrison Street, Suite 400
Portland, OR 97204
503-222-3613

Customer No. 20575